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KITE AND ASSEMBLY CONNECTOR

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KITE AND ASSEMBLY CONNECTOR

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to kites and assembly elements for kites.

Description of the Related Art

The past and current state of technology in the field of kite building has long moved away from the traditional two dimensional diamond frame to more elaborate three dimensional designs such as kites in the shape of airplanes, space crafts, fanciful animals, among many other imaginative figures. However, there are certain disadvantages in creating kites having elaborate designs, including difficulty in assembling a complex three-dimensional structure, which typically includes a number of stiff rods fitted through notches provided on the fabric or synthetic lining of the kite.

SUMMARY OF THE INVENTION

The present invention provides a new connector for kites, and kites utilizing the connector which have a unique and flexible design and are simple to handle. According to one embodiment, the assembly connector is flexible and includes a junction piece and two or more connector legs adjoining the junction piece, each of the connector legs being attachable to a rod of the kite.

Additionally, the assembly connector may be fitted through an aperture or aperture on the airfoil or lining of the kite, enabling a stable structure wherein the lining is supported by the connector, and exerts a force on the connector opposite the force exerted by the kite rods. As a result, a kite in accordance with the present invention utilizes less rods and has a lighter frame, making it less vulnerable to breakage in transit and during assembly and operation, and more suitable for construction of smaller kites.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide a new assembly connector for kites comprising a junction piece and connector legs adjoining the junction piece.

It is a further object of the present invention to provide a new assembly connector for kites which includes a junction piece and connector legs adjoining the junction piece, which allows for support of a lining of the kite.

It is an object of the present invention to provide a new assembly connector for kites which is flexible and lightweight, yet durable and stable.

It is a further object of the invention to provide kites having a unique construction utilizing an assembly connector, which joins two or more rods of the kite, and may be fitted through an aperture in the lining of the kite, whereby the lining exerts a force on the connector opposite the force exerted by the rods.

Other objects and advantages of the present invention will be apparent from a review of the following specification and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a kite having a six point "star" design.

Figure 2 is a perspective view of a connector in accordance with one embodiment of the present invention.

Figure 3 is a sectional view of the connector of Figure 2, taken along line 3-3.

Figure 4 is a view similar to Figure 2, wherein the openings on the legs of the connector can be seen.

Figure 5 is a perspective view of a kite similar to the kite of Figure 1, but having a five point star design.

Figure 6 is a perspective view of a kite having a "ship" design, and utilizing two of the five point star kites shown in Figure 5.

Figure 7 is a perspective view of a connector in accordance with another embodiment of the present invention.

Figure 8 is a perspective view of a kite having an "airplane" design and including the connector of Figure 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The detailed description set forth below in connection with the appended drawings is intended as a description of presently preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed and/or utilized. The description sets forth the functions and the sequence of steps for constructing and

operating the invention in connection with the illustrated embodiments. However, it is to be understood that the same or equivalent functions and sequences may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the invention.

The present invention provides a new assembly connector for kites, and kites utilizing the new assembly connector. While certain kite designs utilizing the new connector are illustrated in the figures, this invention contemplates kites of a variety of different designs.

Figure 1 shows a kite according to one embodiment of the present invention, generally at **8**. Kite **8** typically includes a connector **10** that is coupled to a rod **46** to create the framework of kite **8**. Kite **8** further includes airfoil portions **48** that are configured to couple to connector **10** as well as each other to form the body of the kite.

Airfoil potions **48** are typically configured to include edges that define apertures **52** that are formed to couple to connector **10**, such that airfoil portions **48** create a force inwardly towards the center of the kite, and opposing the force created by the coupling of connector **10** and rod **46**. Preferably, a metal ring outlines the aperture **52** of the airfoil portion **48**, but other configurations may be used, as desired, including a sewn hem around the aperture.

Kite **8** also typically includes a pole **56** and center pole cover **57** that are configured to couple to airfoil portions **48** to form the center of the kite and make the kite more rigid. The kite, including pole **56** and airfoil portions **48**, but not including the rods **46** and connectors **10**, preferably form one unit, with the pole **56** being sewn inside a center pole cover **57**. With this configuration, the kite may be shipped in a relatively small, and generally two-dimensional package. The kite may then be easily assembled before use.

Furthermore, airfoil portions **48** are typically coupled at the sides opposite the connector **10** to center pole cover **57**, or to each other to form the kite. Coupling is typically accomplished by stitching the elements together, however, other configurations may be utilized, as desired. It will be appreciated that other configurations may be utilized to form the interior of the kite, as desired.

Airfoil portions **48** are typically made of nylon fabric or other materials used for kite making, but could be other materials, as desired. Rods **46** are typically rigid plastic, but may be wood or other materials, as desired. With this new connector and kite configuration, sturdy, small, lightweight and durable three-dimensional kites may be easily assembled, disassembled, and provide many fanciful designs not currently possible.

According to a preferred embodiment, the kite **8** is designed on a miniature scale, weighing approximately 0.1 to 1 oz. and more particularly about 0.5 oz., and having dimensions of approximately 3x3x3 to 12x12x12 inches, and more particularly 7.5x7.5x7.5 inches. It will be appreciated that many other dimensions and configurations may be utilized, as desired.

Figure 2 shows a detailed view of a connector **10** according to one embodiment of the present invention. The assembly connector **10** comprises a junction portion **12** and two or more legs adjoining the junction portion **12**, each of the legs having orifices into which a rod can be inserted, to couple them. The legs of the connector, together with the junction portion form a saddle portion **26**, which provides a support point for the airfoil or lining of the kite.

The legs **14** and **16** are typically coupled adjacent or near their first ends **18** and **20** of the junction portion, leaving a saddle portion **26** between the first ends **18** and **20** of the legs **14**

and **16**, which is particularly advantageous in constructing the kite, as will be described in more detail below. Additionally, orifices **28** and **30** are typically included at second ends **22** and **24** of each of the legs **14** and **16** for receiving the end of a rod to form portions of the kite.

The connector is preferably made of a flexible, elastomer-type material such as rubber, or plastic, such that it is flexible and lightweight, yet durable. This enables the angle between the legs **14** and **16** to naturally adjust to an angle necessary for constructing a kite of a particular frame design, making assembly and disassembly very easy, and also provides an extra degree of flexibility during transport, flight and landing.

During assembly of a kite, any one of the legs may be inserted through the aperture **52**, and, depending on the size of the inserted leg, insertion and placement of the aperture in a saddle portion may be aided by bending and/ or compression of the legs.

In the assembled state, the legs **14** and **16** and rods **46** provide generally upward tension on the assembly connector **10**, and the airfoil portions **48** provides downward tension. The overall structure is stable, keeping the aperture **52** firmly engaged within the saddle, as the top region of the aperture engages the top surface of the junction portion **12**, with the first ends **18** and **20** of the legs **14** and **16**, generally above the aperture **52**, thus preventing the connector **10** from slipping out of the aperture **52**.

Since the connectors are flexible, the kite **8** may be easily assembled and disassembled with minimal bending of the rods. Additionally, the structure and design of the kite may force each of the connectors into an angle, other than the fabricated angle, between the legs of the connector, despite the fabricated angle. The flexibility of the connectors further enables the

kite structure to fold into a two-dimensional compact configuration, then be easily transformed into the star design, with minimal assembly required.

For a miniature kite, legs **14** and **16** are typically 0.25-1.0 inches long and 0.015-0.25 inches in diameter. Junction portion **12** is typically 0.015 - 0.25 inches long. It will be appreciated that although these dimensions are for miniature kites, other dimensions may be utilized, as desired.

Figures 1, 5 and 6 illustrate kites utilizing a star shape, and the connector **10**. One example of a star shaped kite **8** utilizing six connectors is shown in Figure 1. The kite **8** includes six equal length rods **46** which form a hexagonal configuration. The kite **8** further includes six similar triangular airfoil portions **48** having inner triangular cutouts **50** centrally joined by a pole **56** and center pole cover **57**. Each of the airfoil portions **48** may have an aperture **52** through which one of the connectors is inserted, where each aperture **52** is engaged within the saddle portion **26** formed between the legs **14** and **16** and junction portion **12**. Thus, each airfoil portion **48** is tautly stretched between the pole **56** and center pole cover **57** and a connector to form the star-like design, whereby two rods and connector exert an outward force, and a airfoil portion **48** exerts an inward force, opposing the outward force such that the kite design is stable. It will be appreciated that although airfoil portions are shown as generally triangular with a cut-out piece, many other geometries and configurations may be utilized, as desired.

Figure 3 shows a cross-section along lines 3-3 of the connector shown in Figure 2. Figure 3 shows orifices **28** and **30** at the second ends **22** and **24** of legs **14** and **16**, which are configured to receive rods **46** to form the framework of the kite. Again legs **14** and **16**, and

junction portion **12** are configured to form a saddle portion **26**, that is configured to receive an airfoil portion of a kite.

Figure 4 is a perspective view from the underside of the connector of Figure 2. Legs **14** and **16** are typically symmetrical about central axis **54**, and form an angle α from a central axis **54**. Connector **10** is typically formed symmetrically about central axis **54**, but other configurations may be utilized, as desired.

Saddle portion **26** is configured to receive portions of the airfoil of the kite, such that the airfoil will exert force opposing the force exerted by the combination of connector **10** and rods **46**.

Furthermore, a connector that is formed of this type of material and configuration to help maintain coupling with the rods, via a friction or interference fit, or other configuration. The assembly connector **10** may be fabricated with the legs **14** and **16**, forming any desired angle α with respect to a central axis **54** of the junction portion **12**, and though the legs are preferably symmetrical with respect to the central axis **54** of the junction portion **12**, they may each form a different angle α with the junction piece axis. Furthermore, connector **10** may also be oriented with a twist, or with the legs skewed, or other configurations, as desired. Different embodiments may include a connector having any number of legs extending from the junction portion(s), wherein the legs may be oriented at any desired angle or with a twist with respect to one another, or other configurations, as desired, depending on the kite design.

Figure 5 shows a five-pointed star kite of the present invention, generally at **64**. Kite **64** typically includes a connector **10** that has a junction portion **12** that forms a saddle portion

26 of which an aperture **52** of airfoil portion **48** couples to such that the force exerted by the airfoil is opposite that exerted by rod **46** and connector **10**.

Figure 6 shows an air ship kite according to another embodiment of the present invention, generally at **60**. Kite **60** utilizes the five-star kite configuration shown in Figure 5 to form a paddle wheel-like portion of kite **60**. It will be appreciated that this configuration may be utilized to form many different kite, toy and chemical model configurations, as desired.

Figure 7 is a connector **70** according to another embodiment of the present invention. Connector **70** typically includes four legs **72**, **74**, **76** and **78** that are coupled together via a junction portion **80** that forms a saddle portion **82** that may allow a portion of an airfoil to fit onto, thus creating a design that will be durable, flexible and easy to assemble and disassemble. In assembly of a kite using this connector, two adjacent legs are inserted through an aperture in a lining of the kite, wherein the lining is held in place between two pairs of legs and rods on opposite sides of the lining.

Although the connector legs are illustrated in the figures as cylindrical, it should be understood that other geometries such as triangular, square, hexagonal, octagonal, and other configurations, may also be utilized. Furthermore, the legs on one connector may vary in length with respect to one another and other numbers of legs may be utilized, as desired. Furthermore, the legs may be configured skewed from each other, and may connect to junction portion in other configurations.

A kite **36** having an airplane design is illustrated in Figure 8, wherein an assembly connector **10** is used to join first and second rods **32** and **34** to each other at an approximately right angle. The kite **36** includes an airfoil portion **38** forming a "fin-like" structure, and

having an aperture **40** through which the assembly connector **10** is inserted, whereby the aperture **40** is engaged within the saddle portion **26** of the assembly connector **10**.

The rods **32** and **34** are firmly held in position between the wings **42** and **44**, which may be supported by the rods **32** and **34**, and/or supported independent of the rods. Though the wings **42** and **44** are illustrated as being held in a leveled position, the wings may also be angled upwards or downwards depending on the length of the rods and angle of the legs **14** and **16** of the assembly connector **10**.

A "fin" as illustrated for the kite **36** of Figure 4 can be incorporated into kites of various designs including stars, animals, fish, ships, surfboards, and the like.

According to a preferred embodiment, the kite **36** is designed on a miniature scale, weighing approximately 0.1 to 2 oz and more particularly 0.3 oz, and having dimensions of approximately 3x3 to 10x10 inches, and more particularly 7x7 inches, wherein the length of the center pole is approximately 7 inches, and the length of each of the rods **32** and **34** is approximately 3.5 inches. It will be appreciated that other dimensions and configurations may be utilized, as desired.

The connector of the present invention allows for a lighter frame since it provides a support point for the airfoil or lining of the kite, thereby reducing the number of rods needed. Such lightweight frame is ideal for smaller sized or miniaturized kites. The flexibility of the connector further reduces bending tension on the rods, and enables easier assembly and disassembly, fold up, and storage, and makes the kite more resistant to breaking and damage during storage, transport, and flight. The flexibility of the connector is further ideal for miniaturized kites as shorter rods are generally more rigid and lightweight.

The connector of the present invention may further be suitable for use with toys, in particular construction toys, and molecular chemistry/ biology sets, including molecular models, and the like.

While the present invention has been described with regards to particular embodiments, it is recognized that additional variations of the present invention may be devised without departing from the inventive concept.